

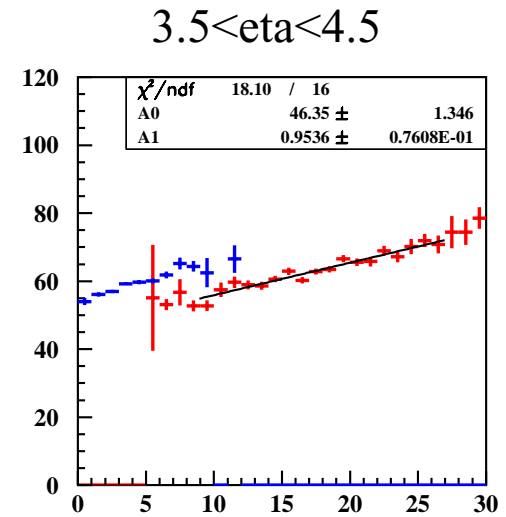
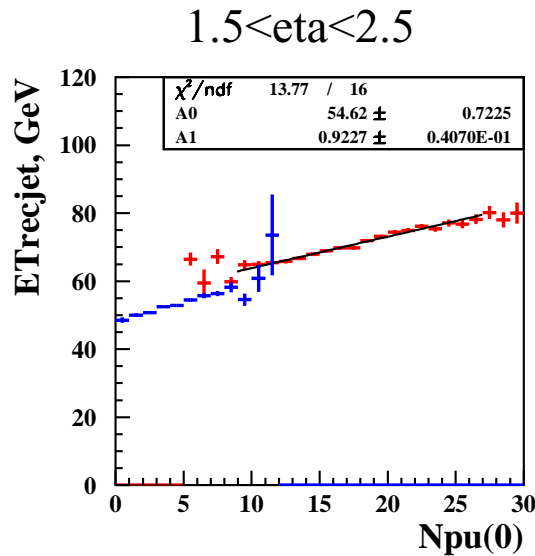
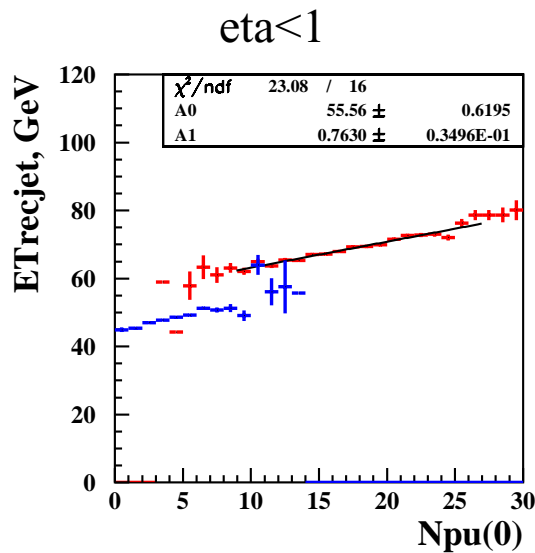
# Performance of jetfinding with pile-up subtraction in ORCA

## Pile-up subtraction algorithm:

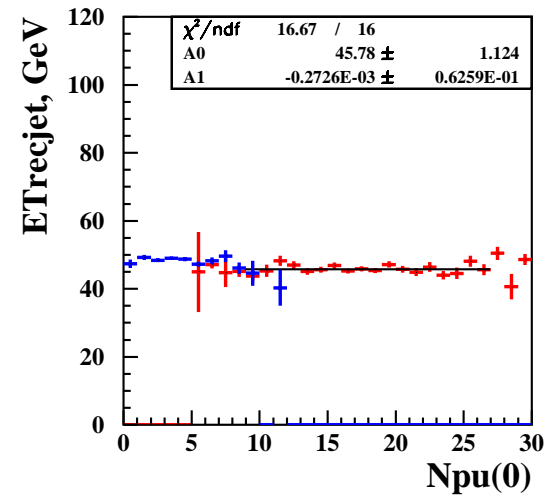
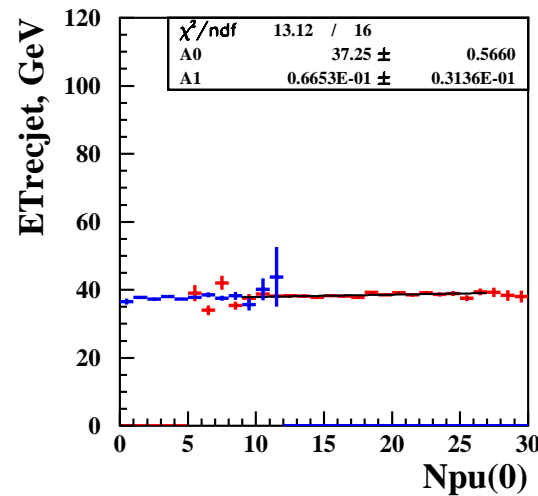
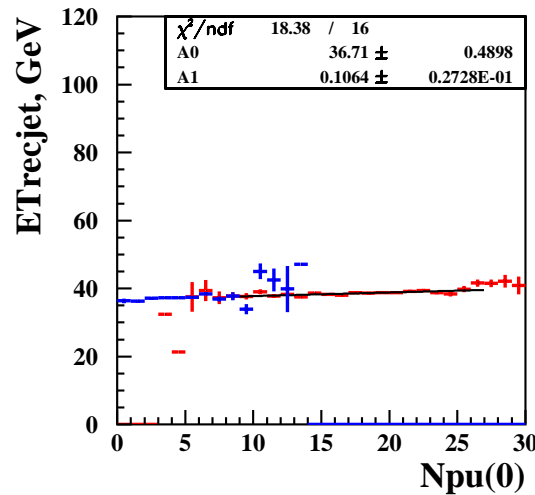
- 1) The average tower transverse energy  $\overline{E_T^{\text{tower}}}(\eta)$  and dispersion  $D_T^{\text{tower}}(\eta)$  is calculated for every  $\eta$ -ring.
- 2) All tower energies are recalculated as  $E_T^{\text{tower}*} = E_T^{\text{tower}} - \overline{E_T^{\text{tower}}}(\eta) - k D_T^{\text{tower}}(\eta)$ , where  $k$  is a tuneable parameter of the algorithm. Negative tower energies are replaced by zeros.
- 3) Jets are found with the standard iterative cone algorithm using new tower energies  $E_T^{\text{tower}*}$ . I use zero seed threshold.
- 4) The average tower transverse energy  $\overline{E_T^{\text{tower}}}(\eta)$  and dispersion  $D_T^{\text{tower}}(\eta)$  is recalculated using original energies from all towers except those which fall inside the cones of  $R=0.7$  around the jets with transverse energies above 10 GeV (another tuneable parameter).
- 5) The tower energies are recalculated again as  $E_T^{\text{tower}*} = E_T^{\text{tower}} - \overline{E_T^{\text{tower}}}(\eta) - k D_T^{\text{tower}}(\eta)$  and the final jets are then found with the same iterative cone algorithm.

To tune and test the algorithm I use the high luminosity di-jet event samples from the Spring 2000 production. I take two leading particle jets found with the conesize  $R=0.7$  and match them with nearest calorimeter jets reconstructed with different algorithms and parameters.

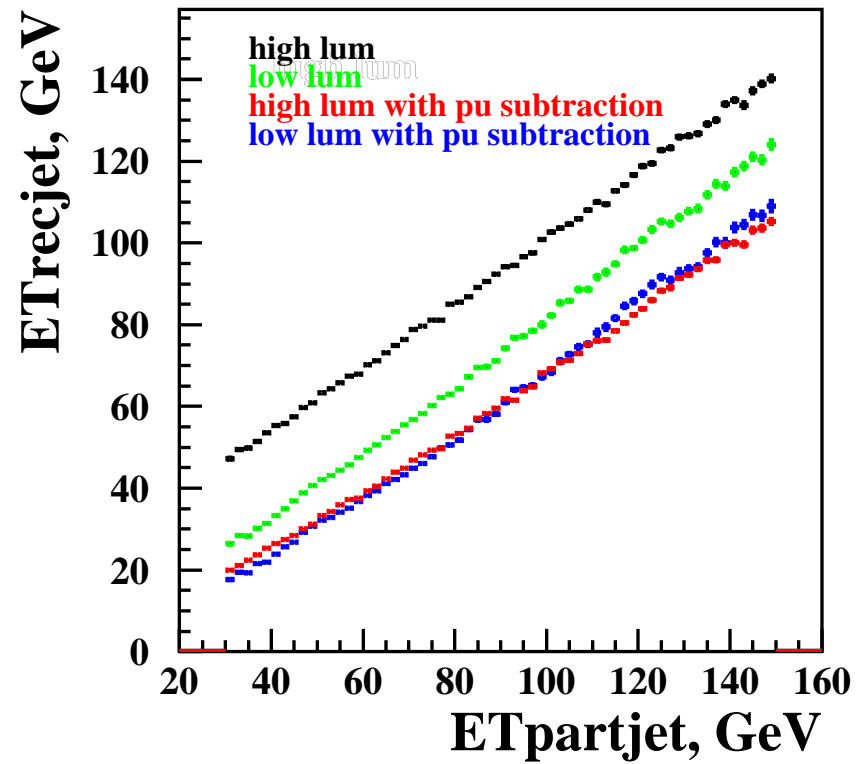
Average response to particle jets  $50\text{GeV} < ET < 70\text{GeV}$  as a function of the number of intime pile-up events at **low** and **high** luminosity. Calorimeter jets are reconstructed with the conesize  $R=0.7$  without pile-up subtraction.



Average response to particle jets  $50\text{GeV} < E_T < 70\text{GeV}$  as a function of the number of intime pile-up events at **low** and **high** luminosity. Calorimeter jets are reconstructed using pile-up subtraction with  $k=1$  and the conesize  $R=0.7$ .



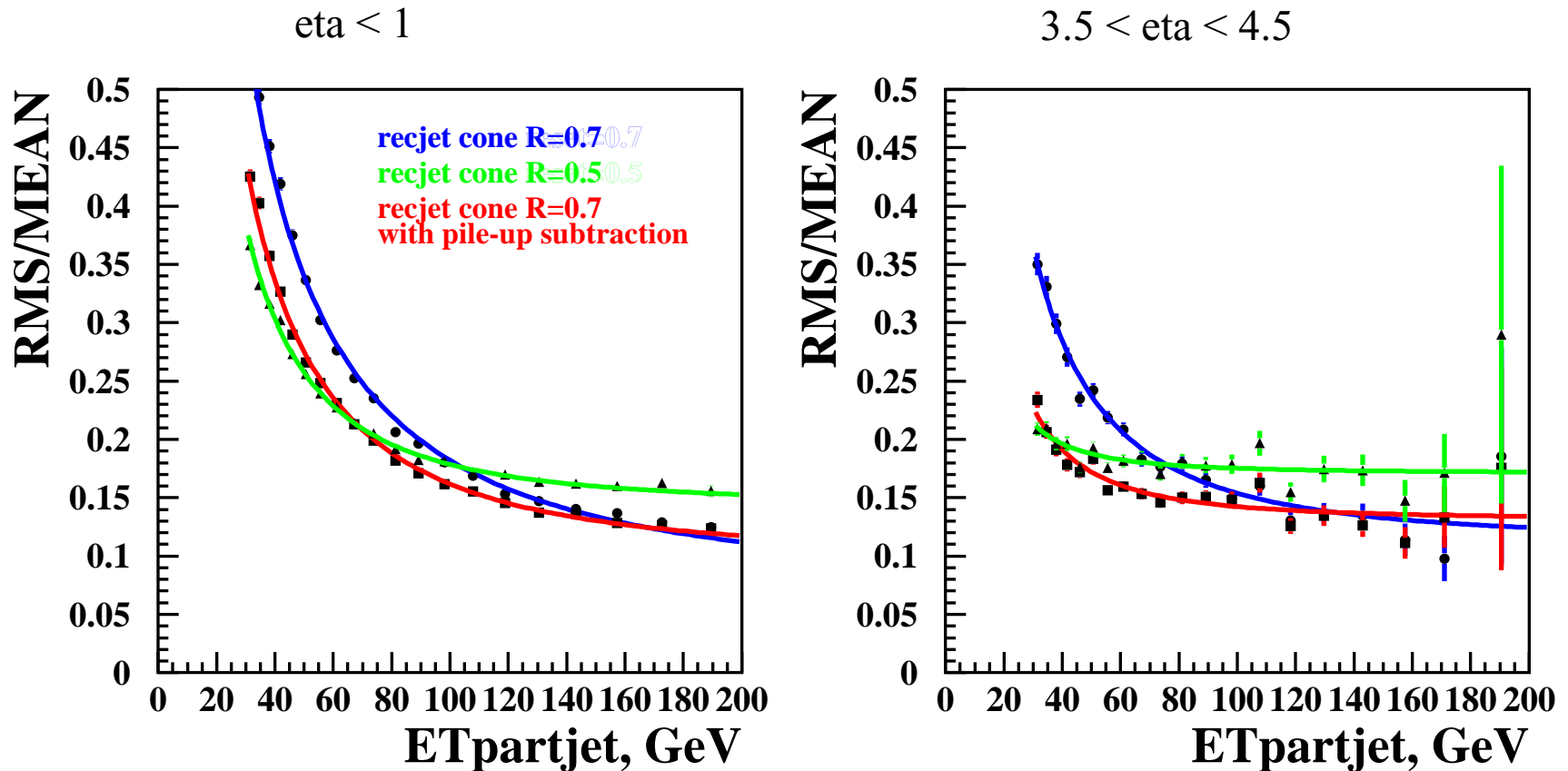
## Jet energy scale at low and high luminosity ( $\text{ETA}_{\text{jet}} < 1$ )



## Jet energy resolution (particle jet cone R=0.7)

For each algorithm energy scale corrections were calculated and applied, so that

$$\langle \text{ETcorr}(\text{ETrecjet}) \rangle = \text{ETpartjet}$$



The algorithm results in a perceptible energy resolution improvement for jets with  $ET < 100$  GeV.

Cancels the effects of luminosity variations and beam gaps on jet energy scale.

Probably needs some more tuning.

Need to look at jet reconstruction efficiency and fake jet rejection.